Attending to the Needs of the U.S. Nuclear Weapons Stockpile

Lawrence Livermore National Laboratory was established in 1952 to help ensure national security through the design, development, and stewardship of nuclear weapons. Many advances in nuclear design and the capabilities and safety of deployed weapons are attributable to the Laboratory. Livermore is now one of the three national security laboratories that are part of the National Nuclear Security Administration (NNSA) and the Stockpile Stewardship Program to maintain the nation's nuclear deterrent.

Life Extension of the W87 ICBM Warhead

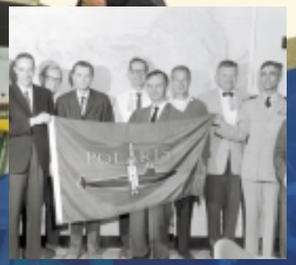
In April 2001, General John Gordon, NNSA administrator, and Admiral Richard Mies, commander-in-chief of U.S. Strategic Command, participated in a ceremony at Livermore to recognize the signing of the W87 Life Extension Program (LEP) Final Development Report. This first completed certification of the engineering design and production processes for an LEP is a groundbreaking milestone for the Stockpile Stewardship Program.

The objective of the LEP has been to enhance the integrity of the W87 intercontinental ballistic missile (ICBM) warhead so that it can remain part of the enduring stockpile beyond 2025 and meet anticipated future requirements. The W87 is the most modern ICBM warhead in the nation's nuclear weapon stockpile. It includes such features as insensitive high explosive and a fire-resistant pit. Together, the W87 warhead and Mk21 reentry vehicle are planned for deployment on the Minuteman-III ICBM when the U.S. ends deployment of multiple warheads on ICBMs.

The successful W87 LEP is an example of the NNSA laboratories and production facilities working together to overcome physics, engineering, and manufacturing challenges and meet Department of Defense requirements without conducting a nuclear test. The development activities conducted by Livermore included extensive flight testing, ground testing, and physics and engineering analysis. Assessment of nuclear performance is based on computer simulation, past nuclear tests, and new aboveground experiments that address specific physics questions raised by the engineering alterations and computer simulations. The first refurbished unit was completed in February 1999, and the final production unit is scheduled for completion in 2004.

In addition, Lawrence Livermore and Sandia National Laboratories, California, have been assigned by NNSA responsibility for the program to extend the life of the W80 cruise missile warhead. After production of the refurbished warheads, Livermore will be responsible for continuing evaluations of their performance. Los Alamos, which originally designed the W80, will retain this responsibility for unrefurbished W80s.

1950s



Breakthroughs in nuclear weapon design by the Laboratory made it possible to deploy a megaton-class warhead on submarine-launched ballistic missiles (SLBMs). Polaris submarines, each equipped with 16 SLBMs carrying Livermore's W47 warhead, provided the nation a highly survivable retaliatory capability to deter a Soviet attack.

1960s

Building on the advances for the Polaris program to make thermonuclear designs smaller, Livermore developed the first weapons for ballistic missiles that carried multiple warheads. These included the W62 for Minuteman-III ICBMs (three reentry vehicles each) and the W68 for Poseidon C-3 SLBMs (10 reentry bodies each).

1970s

With Europe central to the Cold War confrontation, modernization of the theater nuclear forces for NATO was a priority. The Laboratory developed the W70 warhead for the Lance missile, the W84 for the ground-launched cruise missile, and enhanced radiation designs for a modification to the W70 and the W79 8-inch artillery shell.

1980s

U.S. strategic force modernization programs led to the weapon systems that comprise today's nuclear deterrent, including two Livermore-developed systems, the B83 strategic bomb and the W87 ICBM warhead. Research at the Laboratory also explored the feasibility of nuclear directed-energy weapons, such as the x-ray laser, for defensive applications.

1990s

With a moratorium in place on nuclear testing, the Laboratory enhanced its efforts and capabilities to ensure that deployed nuclear weapons remain safe, secure, and reliable as they continue to age. These activities, which support annual certification of the weapons and weapon refurbishment programs, are part of the nation's Stockpile Stewardship Program.